

course, which terminates at the penis, it is $\frac{1}{4}$ or sometimes $\frac{1}{3}$ millim. The narrow portion of the duct is pellucid; the dilated portion, of an opaque white, is composed of the same layers which are met with in the *flagellum* of the *Helices*. Beneath an external cellular membrane we find a muscular membrane, followed in its turn by a glandular layer, which does not exist in the narrow part of the duct.

In the wide portion of the same organ we observe numerous lamellæ arranged like the spiral fibre of the tracheæ of plants. These lamellæ extend in an oblique spiral between the two margins of this portion of the canal, their obliquity increasing towards the point of junction of the two portions of the latter, in the neighbourhood of which they finally become longitudinal. At the breeding-time they are covered with solid white particles, which effervesce with hydrochloric acid.

In its movement of retroversion the penis is followed by the inferior deferent canal, which contains the *capreolus* until the moment when this body is expelled.—*Comptes Rendus*, November 4, 1872, tome lxxv. pp. 1126, 1127.

On the Developmental History of Petromyzon. By A. SCHNEIDER.

Since August Müller published his fine discovery of the transformation of *Ammocetes* into *Petromyzon* (Müller's Archiv, 1856; see also Ann. & Mag. N. H. ser. 2, vol. xviii. p. 298), every zoologist must certainly have been desirous of witnessing this wonderful metamorphosis. Here in Giessen the opportunity seemed to offer itself to me; for, in the Bieberbach, *Ammocetes branchialis* occurs in such abundance that in the course of two years I obtained about two hundred *Ammocetes* and a dozen of *Petromyzon Planeri*. But I never obtained the transition-stages, nor could I succeed in getting full-grown specimens of *Ammocetes* to undergo any further development in tanks. I must therefore acknowledge with thanks that Prof. von Siebold had the kindness to give me two specimens of the transition-stage which were in his possession. As I was sufficiently familiar with the structure of *Ammocetes* and *Petromyzon*, these sufficed to give me an insight into some of the most important processes.

On the ventral surface of the *Ammocetes* there is an elongate-oval organ, already mentioned by Rathke, which was regarded by A. Müller as the rudiment of the tongue, but the structure of which has hitherto remained entirely unknown. It is a gland which opens into the œsophagus in the ventral line between the third and fourth branchial clefts. Its structure differs from that of all other known glands. The orifice leads into two tubes lying close to one another, and which extend forward to the end of the branchio-œsophageal cavity, and backward to the boundary between the fifth and sixth branchial clefts. Just at the orifice another tube branches off on each side, passes a short distance backward, and then, bending upward and forward, reaches the vicinity of the orifice of the gland, then again bends downward and backward, and again downward and forward, so that it describes about $1\frac{1}{2}$ spiral convolution. In the part situated in front of the orifice of the gland, there are on each side four cords consisting of nucleated cells. The cells are cu-

neiform, with a polyhedral transverse section; they stand with their bases at the surface of the cord; and all converge towards a longitudinal central surface. The whole mass appears as if finely striated; but the striation does not seem to be due to fibrillæ, but only to the edges of the rather thin cells.

These four cords are united by vascular connective tissue into a thick compact cord, which, lying upon the tube, projects into its lumen. The inner surface of the tube, including the compact cord, is covered by a ciliated epithelium. The four distinct cords lie at the surface of the compact cord something like four cylinders which are enveloped by a larger cylinder touching them. At the line of contact the ciliated cells are deficient, and the subjacent glandular substance appears freely towards the lumen of the tube. These places are also those towards which the cells converge. Of the four cords, two run into the portion of the tube which extends directly backward, whilst two pass into the spirally convoluted part and follow its convolutions. In other respects the structure in the hinder part is exactly as in the anterior part. No trace of a neutral fluid is to be found in the gland.

From this gland the tongue certainly does not originate, as has been concluded from its position, but during the metamorphosis the striated cell-substance disappears. The connective tissue and the epithelial lining of the tubes remain; the latter separates from the wall, and in part remains tubular, but in part constricts itself into balls. In short, there is produced from it an organ which, both in position and structure, agrees with the thyroid glands of the developed vertebrate. The organ described as the thyroid gland in *Petromyzon* by Wilhelm Müller (*Jenaische Zeitschr.* vi. p. 433), I cannot regard as the same, either in structure or position. I have found the true thyroid gland both in *P. Planeri* and *P. fluviatilis*; and it will certainly not be deficient in the other species. In *Ammocetes* consequently we find for the first time, and hitherto alone among all Vertebrata, *the thyroid gland in function during a long period of life and in a high state of development.*

The branchial clefts in *Ammocetes*, as is well known, open into the œsophagus—but in *Petromyzon* into a free tube, closed posteriorly, the bronchus, above which there is an œsophagus which unites the intestinal canal with the buccal cavity. From the mere comparison of *Ammocetes* and *Petromyzon* we cannot see how the new state is produced from the old one. This takes place as follows:—The œsophagus is formed in the dorsal median line of the branchial cavity as a solid cord, consisting of round, closely approximated nuclei, only separated by a little interstitial substance; and into this a cavity penetrates from the front and gradually renders it permeable. At the same time an increase of the blood-vessels commences in the connective tissue which surrounds the branchial cavity and the œsophagus. The vessels finally coalesce, so that both the bronchus and the œsophagus lie free in a great blood-space, extending from the so-called pericardium to the point of the head. In this are also situated the branchial artery, the tongue, and the branchiæ themselves.

The above-mentioned foundation of the œsophagus is not indicated at all in *Ammocetes*. It must not be confounded with the fold which hangs down from the dorsal median line into the branchial cavity of *Ammocetes*.

One of the first processes of the metamorphosis must be the formation of the tongue; in both my specimens it was already formed, whilst the œsophagus was only permeable for a few millimetres, and the mouth still possessed the narrow opening figured by Von Siebold (*Süsswasserfische von Mitteleuropa*, p. 381).—*Oberhessischen Gesellschaft für Natur- und Heilkunde*, January 11, 1873.

On the Parasites of the Cetaceans of the N.W. Coast of America, with Descriptions of New Forms. By W. H. DALL, U. S. Coast Survey.

Among the parasites most widely known as infesting the Cetacea, two classes may be recognized, viz. those which are true parasites, deriving their subsistence from the animal upon which they are found, such as the Pycnogonoids and *Cyami*; and those which are merely sessile upon the animal, and derive no nourishment or other benefit from it which might not equally well be furnished by an inanimate object, such as the various Cirripedes.

No Pycnogonoids have yet been reported from the Cetacea of this coast. Brief descriptions of the species of *Cyamus* found upon the California grey, the humpback, and the Arctic bowhead whales were submitted by me to the Academy at a recent meeting. I may here add to those descriptions a few facts since obtained, and bearing upon the species described. I have, through the courtesy of Capt. Scammon, been able to examine a large number of *Cyami* obtained at Monterey, Cal., from the humpback (*Megaptera versabilis*, Cope). They are all of the same species as that (*C. suffusus*) described by me as parasitic upon that whale—a fact which tends to confirm the hypothesis that each species of whale has its own peculiar parasites, and that there is rarely more than one species of *Cyamus* found upon one animal. The females, which were unknown at the date of my description, now prove to resemble the male in every respect, except in regard to the sexual organs, and in being a trifle more slender in form.

Among the Cirripedes, *Tubicinella* has not been reported from these waters, nor is the *Chelonobia* known to have been obtained from any of the whales of this coast. The genera known from the north Pacific waters are *Coronula*, an allied form which I believe to be uncharacterized, and *Otione* or a closely allied form.

SESSILIA.

CORONULA, Lam.

Coronula, Lamk. An. s. Vert. v. p. 387.

Coronula balenaris, Linn. sp.; Lamk. Ann. du Mus. i. p. 468, pl. 30. figs. 2-4.

This species, or one very closely allied to it, was obtained by the late Mr. Bridges, probably from the coast of Central America; but the identification of the exact locality and the species of cetacean